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Nickerson, Doak, "G00-1417 Site Preparation: Key to Successful Conservation Tree Planting in Western Nebraska (Revised February 2002)" (2000). *Historical Materials from University of Nebraska-Lincoln Extension*. 1902.

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G1417
(Revised February 2002)

Site Preparation: Key to Successful Conservation Tree Planting in Western Nebraska

Doak Nickerson, District and Extension Forester

This NebGuide explains when and how to do site preparation for conservation tree planting in Western Nebraska.

Benefits of Site Preparation

Establishing a conservation tree planting can be a challenge in semiarid regions like western Nebraska, where annual precipitation of 20 inches or less is the norm. Tree planting failure commonly occurs as a result of poor site preparation coupled with inadequate weed and grass control the first three to five years after planting. Effective site preparation (*Table 1*) begins the year before planting. The results help young trees survive and grow in several ways:

- Increases the soil moisture needed for firm compaction, thereby reducing the risk of air pockets drying out and killing tree roots;
- Reduces present and future weed and grass competition, resulting in extra soil moisture, nutrients and sunlight for trees;
- Conditions and mellows the soil, making it easier to plant trees by machine and/or hand;
- Improves the effectiveness of follow-up weed and grass control practices; and

- Enhances rodent control measures which deter feeding damage on trees.

This is evident by the growth difference of two 10-year-old Rocky Mountain juniper trees (*Figures 1 and 2*), both planted on the same date and site in western Nebraska (Sioux county). *Figure 1* was planted directly in grassland (sod) with no advance site preparation. *Figure 2* was planted in a section of the grassland site that had been fallowed one full year before tree planting. The growth rate of *Figure 2* is triple that of its counterpart, which is clear evidence that advance planning and excellent site preparation (fallow) help lead to success. Fallowing is a common farming practice in semiarid regions that has proven to be the “secret” in getting a new tree planting off to a good start.



Figure 1. Ten-year-old Rocky Mountain juniper planted in grassland not fallowed.



Figure 2. Ten-year-old Rocky Mountain juniper planted in fallowed grassland.

Table I. Site Preparation Guide - Refer to NebGuide text (Table I - Reference) for detailed explanation.

Land Use	Topography	Soil	Site Preparation
Cropland ^{1,15}	Flat ³	Clay/Loam ⁵	Plant directly into site/area(s)*; do not destroy existing crop residue (<i>Figure 3</i>). ^{7,8}
		Sand ⁶	Sow late summer crop to prevent winter wind erosion. Plant directly into site/area(s)*; do not destroy existing crop residue (<i>Figure 4</i>). ^{7,8}
	Slope ⁴	Clay/Loam ⁵	Plant directly into site/area(s)*; do not destroy existing crop residue (<i>Figure 3</i>). ^{7,8} Plant on contour, if possible.
		Sand ⁶	Sow late summer crop to prevent winter wind and/or water erosion. Plant directly into site/area(s)*; do not destroy existing crop residue (<i>Figure 4</i>). ^{7,8} Plant on contour, if possible.
Grassland ^{2,15}	Flat ³	Clay/Loam ⁵	Fallow ⁹ entire site or area(s)* one year prior to planting (<i>Figure 5</i>). ¹⁰ Plant directly into site or area(s)*; do not destroy dead grass residue. ¹¹ Alternative is wide scalping (<i>Figure 6</i>). ¹⁴
		Sand ⁶	Fallow ⁹ area(s)* one year prior to planting (<i>Figure 5</i>). ¹⁰ Plant directly into area(s)*; do not destroy dead grass residue. ¹¹ Narrow scalping is recommended (<i>Figure 7</i>). ¹⁴
	Slope ⁴	All Soils ^{5,6}	Fallow ⁹ area(s)* one year prior to planting (<i>Figure 8</i>). ¹² Plant directly into area(s)*; do not destroy dead grass residue. ¹³ Plant on contour, if possible.

*Area(s) defined as 6 to 8 feet wide strip(s), circle(s) and/or square(s) with tree(s) centered and planted in the area(s).



Figure 3. Machine tree planting in cropland (wheat stubble residue).



Figure 4. Trees planted in cropland (6 to 8 feet wide strips of wheat killed with postemergence herbicide prior to planting).

Table I — Reference

¹**Cropland** has been farmed the past year(s) and grew an agricultural crop (annual) the prior growing season(s), including irrigated and/or dryland crops. Due to absence of highly competitive perennial vegetation, cropland sites typically require very little or no site preparation and are usually ready to plant trees.

²**Grassland** has not been farmed the past year(s); it has grown perennial grasses/sedges (sod), alfalfa, perennial forbs, clover, perennial shrubs and/or annual weeds/grasses the prior growing season(s). Due to the highly competitive nature of this vegetation, all grassland sites need to be fallowed one full year in advance of tree planting.

³**Flat** lays relatively level with slopes ranging from 0 to 2 percent. In the absence of crop residue and/or vegetation on the soil surface, this land can be prone to wind erosion with less risk of water erosion.

⁴**Slope** is not level and has slopes ranging from 3 to 30 percent or greater. In the absence of crop residue and/or vegetation on the soil surface, this land can be prone to both wind and/or water erosion.

⁵**Clay/Loam** (moist) will form a “ribbon” that does not crumble when squeezed between the forefingers and thumb. They are commonly referred to as “heavy” soils.

⁶**Sand** (moist) will form a “ribbon” that crumbles when squeezed between the forefinger and thumb. It is sometimes referred to as “light” soil.

⁷If cool season annuals (weeds, grasses and/or crops like wheat, oats, triticale, rye, barley) are beginning to grow in early spring prior to planting, till the site/area(s) “lightly” and/or treat with labeled, preemergence and/or postemergence herbicide** to conserve crop residue.

⁸Check for herbicide carryover via farm records and/or soil analysis. Delay (one year) planting into cropland that has been treated with non-labeled, residual, soil active herbicide(s)** the prior growing season(s).

⁹**Fallow** is done one full year prior to planting, whereby the ground is tilled, mulched and/or herbicide** treated to eliminate soil moisture loss from weed/grass growth and preserve it for new tree seedlings. A tree planting that is fallowed by mulching with man-made fabric (*Figure 9*) is limited to follow-up hand planting, only.

¹⁰**Fallow** mechanically (“light” tillage or wide scalping), soil surface mulch (organic or man-made fabric) and/or chemically (no-till followed by narrow scalping) with labeled, preemergence and/or postemergence herbicide** to conserve dead grass residue.

¹¹If cool season, annual weeds/grasses are beginning to grow in early spring prior to planting, till the site/area(s) “lightly”, apply new layer of mulch (organic) and/or treat with labeled, preemergence and/or postemergence herbicide** to conserve dead grass residue.

¹²**Fallow** via soil surface mulch (organic or man-made fabric) and/or chemically (no-till) with labeled, preemergence and/or postemergence herbicide** to conserve dead grass residue.

¹³If cool season, annual weeds/grasses are beginning to grow in early spring prior to planting, apply new layer of mulch (organic) and/or treat the area(s) with labeled, preemergence and/or postemergence herbicide** to conserve dead grass residue.

¹⁴**Scalping** removes soil surface residue for more efficient planting, reduces competition for soil moisture from unwanted weeds/grasses, creates water/snow catchment area(s) and provides some wind protection. It is accomplished mechanically by two methods:

- Wide scalping of an area (6 to 8 feet wide, 3 inches deep) via motor grader or large farm blade; soil/sod is scalped off to the upwind side followed by deep tillage/roughening of the area(s) one year ahead of planting, leaving a windrow of soil/sod to catch winter snow; prior to planting in spring, windrow of soil and dead sod is spread back out over the 6 to 8 feet wide fallow area(s) via grader/blade.
- Narrow scalping of a furrow (12 inches wide, 3 inches deep) via two small plow share attachments (scalpers) that mount on both sides of the tree planting machine’s coulter wheel, scalping the soil and dead sod residue as trees are planted.

Scalping also can be done manually with the tree centered and hand planted in a circular basin (12 inches wide, 3 inches deep) built with a shovel.

¹⁵**Hardpan** may be present as a result of farming, overgrazing by livestock, heavy vehicle traffic and/or soil geology. This is especially true of clay or loam soils. Check for hardpan by pushing a slender metal rod into “moist” soil; if the rod is hard to push or stops abruptly, then hardpan may exist. Confirm this by hand digging a hole with a shovel. Break up the hardpan with deep tillage (12 to 24 inches) one year prior to planting via use of a chisel, subsoiler or ripper/scarifier (*Figure 10*).

**Refer to the latest University of Nebraska Cooperative Extension Circular titled *Guide for Weed Management in Nebraska* EC-130; determine appropriate use and application of herbicide(s) for site preparation before the planting plan is developed and trees are planted.



Figure 5. Trees planted in grassland (6 to 8 feet wide fallowed strips by tillage).



Figure 6. Wide scalping in grassland using motor grader (6 to 8 feet wide fallow strips).



Figure 7. Narrow scalping in grassland using tree planting machine fitted with plow share attachments (scalpers).



Figure 8. Six to 8 feet wide fallowed strips in grassland (no-till via preemergence/postemergence herbicide).



Figure 9. Trees hand planted in grassland (6 to 8 feet wide fallowed strips with man-made fabric).



Figure 10. Deep chiseling in cropland to break up hardpan.

**File under: FORESTRY
B-16, Tree Planting**
Revised February 2002, 2,500

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